IN THE CLAIMS

The text of all pending claims, along with their current status, is set forth below in accordance with 37 C.F.R. § 1.121.

1. (Original) A computer system comprising memory means, storage means, and an object-oriented software product, the software product containing an object-oriented extensible class hierarchy for the storage of transport phenomena simulation data, the class hierarchy comprising a first set of generic classes representing a plurality of object types and a second set of generic classes representing member variables for the object types, the extensible class hierarchy permitting the addition of additional object types and additional member variables without any modifications to the class hierarchy itself.

2. (Original) The computer system of claim 1 wherein the transport phenomena comprises one or more of momentum, energy, and mass transport within a subsurface hydrocarbon-bearing reservoir and between the subsurface hydrocarbon-bearing reservoir and one or more delivery locations at the earth's surface.

3. (Original) The computer system of claim 2 wherein the transport between a subsurface hydrocarbon-bearing reservoir and one or more of the delivery locations comprises one or more transport pathways, the transport pathways comprising at least one of production and injection well types and one or more facility types that are linked together to form a facility network through which hydrocarbon fluids are transported between the subsurface reservoir and the delivery locations.

4. (Original) The computer system of claim 3 wherein the facility types contained within the transport pathways comprise at least one facility selected from surface flowlines, manifolds, separators, valves, pumps, and compressors.

5. (Original) The computer system of claim 4 wherein a text file (Data Definitions File) contains the definitions of the possible facility types that can be included in a simulation model and the definitions of the possible member variable types for each facility type.

6. (Original) The computer system of claim 1 wherein the object-oriented software product comprises a graphical user interface whereby a user of the computer system defines a simulation model containing the specific network of wells and facility objects to simulate transport phenomena into and out of a specific hydrocarbon-bearing reservoir.

7. (Currently Amended) The computer system of claim 1 comprising a graphical user interface configured to enable ~~wherein additional data member types being defined by the user of the object-oriented software product computer system of claim 1 wherein~~ a user of the computer system to define the ~~defines~~ additional member variables ~~facility data members by a graphical user interface, said additional data members extending~~ that extend the functionality of the computer system in a user-customizable manner.

8. (Original) The object-oriented software product of claim 1 wherein the object-oriented software is written in C++.

9. (Original) The computer system of claim 1 wherein the storage means comprises an object-oriented database.

10. (Currently Amended) A method of simulating transport phenomena in a facility network using a computer system having memory means, storage means, and object-oriented software, the method comprising the steps of:

~~(a)~~ ——building a model comprising a facility network, wherein the facility network comprises facility instances formed from facility types based on a first set of generic classes and member variable instances formed from member variables for the facility types based on a second set of generic classes, and wherein the first set and second set of generic classes are part of a class hierarchy that is not modified by the addition of other facility types and member variables;

~~(b)~~ ——specifying values of the member variables and the facility types for ~~each~~ the facility network, wherein the specified values of the facility types form facility instances, the specified values of the member variables form member variable instances; ~~and~~

~~(c)~~ ——using the ~~specified values of the member variables~~ facility instances and member variable instances in a mathematical simulation of transport phenomena within the facility network as a function of time; and

using the mathematical simulation of transport phenomena to manage the facility network.

11. (Original) The method of claim 10 wherein the facility network is part of a larger simulation model, with said facility network being capable of exchanging fluids with at least one other part of the simulation model.

12. (Original) The method of claim 11 wherein the simulation model comprises a facility network and a hydrocarbon-bearing formation.

13. (Currently amended) A method of simulating transport phenomena in a physical system comprising a hydrocarbon-bearing reservoir penetrated by a plurality of wells and surface facilities, connected to the plurality of wells, the method comprising:

~~a.~~ ——discretizing ~~the~~ a physical system into a plurality of volumetric cells, wherein each volumetric cell is modeled as a node, and adjacent nodes being capable of exchanging fluid through connections between the nodes;

~~b.~~ ——using facility instances ~~objects~~ and member variable instances ~~objects~~ of a ~~the~~ class hierarchy ~~of claim 1~~ to model the nodes and connections in the portion of the discretized model that represents ~~the~~ wells and surface facilities of the physical system, wherein the class hierarchy comprises a first set of generic classes representing facility types utilized to create the facility instances and a second set of generic classes representing the member variables for the facility types utilized to create the member variable instances, the class hierarchy permitting the addition of additional facility types and additional member variables without any modifications to the class hierarchy itself;

~~c.~~ ——specifying ~~the~~ geometric and transport properties for each node and connection;

~~d.~~ ——specifying ~~the~~ initial conditions for each node and connection; ~~and~~

~~e.~~ simulating as a function of time the transport phenomena in the discretized physical system; and

~~f.~~ using the simulation of transport phenomena to manage the physical system.

14.-15. (Canceled)

16. (New) A computer implemented method of modeling a hydrocarbon system comprising:

accessing an application on a computer system having a first set of generic classes and a second set of generic classes associated in a class hierarchy;

using facility types for a hydrocarbon facility network created from the first set of generic classes;

using member variables that are associated with at least one of the facility types and created from the second set of generic classes, wherein the facility types and the member variables do not modify the class hierarchy of the first set of generic classes and the second set of generic classes;

simulating the hydrocarbon facility network with facility instances created from the facility types and the member variables instances created from the member variables; and

using the simulation to manage reservoir and a delivery location of transport phenomena of the hydrocarbon facility network.

17. (New) The method of claim 16 wherein the simulation models fluid transport between a surface facility and a subsurface formation accessed by a well.

18. (New) The method of claim 16 wherein the facility types comprises one or more of surface flowlines, manifolds, separators, valves, pumps, compressors, and any combination thereof.

19. (New) The method of claim 16 wherein the simulation models fluid transport between surface facilities and a subsurface formation accessed by a plurality of wells.

20. (New) The method of claim 16 comprising coding the first set of generic classes representing the facility types and the second set of generic classes representing member variables prior to loading the application onto the computer system.

21. (New) The method of claim 16 comprising using a text file configured to define the facility types and the member variables for use in the simulation, wherein the facility types and the member variables may be accessed without being having to be coded as part of the application.

22. (New) The method of claim 16 comprising:

creating facility instances from the facility types by a simulator user; and

utilizing the facility instances to represent components of the hydrocarbon facility network for the simulation.